

Amendments to the Specification:

The following amendments have been incorporated into the attached application.

Please amend the text on lines 1-2 on page 1 of the application with the following: ~~POWER AND BANDWIDTH ADAPTIVE IN HOME WIRELESS COMMUNICATIONS SYSTEMS WITH POWER GRID POWERED AGENTS AND BATTERY POWERED CLIENTS~~ ADAPTIVE LOCAL WIRELESS COMMUNICATION SYSTEM.

Please amend the paragraph beginning at page 1, line 4 as follows: ~~The present patent~~ This application is a continuation of 09/663,068, filed September 15, 2000, which claims priority to descended from, and claims benefit of priority of, United States Provisional Patent Application Serial Number 60/154,615 filed September 17, 1999, for POWER AND BANDWIDTH ADAPTIVE IN HOME WIRELESS COMMUNICATIONS SYSTEMS WITH POWER GRID POWERED AGENTS AND BATTERY POWERED CLIENTS to the same inventor as the present application The entire disclosures of the above-referenced patent applications are hereby incorporated by reference.

Please amend the paragraph beginning at page 2, line 13 as follows:

The present invention will be seen to be a system and a method that can be implemented by use of the Bluetooth, or the HomeRF, standard and protocol, among other standards and protocols. Review of these wireless communications standards is useful primarily so as to show that the wireless communications

links realized by the present invention are neither new nor exotic; circa 2000. ~~If the reader is familiar with the organization, and self-organization, of wireless communications networks then the following sections 2.2 and 2.3 may be skipped.~~

Please amend the paragraph beginning at page 5, line 28 as follows:

Some examples of what users will be able to do with the availability of products that adhere to the SWAP specification include:

[[Setting]]setting up a wireless home network to share voice and data between PC's, peripherals, PC-enhanced cordless phones, and new devices such as portable, remote display pads[[.]] ;

[[Accessing]]accessing the Internet from anywhere in and around the home from portable display devices[[.]] ;

[[Sharing]]sharing an ISP connection between PC's and other new devices[[.]] ;

[[Sharing]]sharing files/modems/printers in multi-PC homes[[.]] ;

[[Intelligently]]intelligently forwarding incoming telephone calls to multiple cordless handsets, FAX machines and voice mailboxes[[.]];

[[Reviewing]]reviewing incoming voice, FAX and e-mail messages from a small PC-enhanced cordless telephone , handset[[.]] ;

[[Activating]]activating other home electronic systems by simply speaking a command into a PC-enhanced cordless handset[[.]] ; and

[[Enabling]]enabling multi-player games and/or toys based on PC or Internet resources.

Please amend the paragraph beginning at page 8, line 27 as follows:

The improvement accorded by the present invention to the existing "framework" of home and office wireless communication systems is this: the present invention adds "agents". ~~In accordance with the present invention, much of the communications power requirement for local, home or office, wireless communication away from "clients" functional devices such as telephones and computers and televisions and key pad controllers and burglar-9 alarms and household appliances and hybrids thereof — is moved from these "clients" onto a new class of radio communicating networked devices intermediaries in the overall scheme of wireless communications called "agents".~~
In accordance with the present invention, much of the communications power requirement for local, home or office,

wireless communication away from "clients" is moved from these "clients" onto a new class of radio-communicating networked devices which include intermediaries in the overall scheme of wireless communications and are referred herein as "agents." Examples for "clients" include, among others, functional devices such as telephones, computers, televisions, key pad controllers, burglar alarms, household appliances, and hybrids thereof.

These abundant, low-cost, agents are essentially non-power-limited radio-frequency transceivers that plug inconspicuously into otherwise unused wall power outlets of the home or business. The agents may physically resemble surge protectors.

Please amend the paragraph beginning at page 9, line 14 as follows:

~~Although some clients -- notably including non-portable species of computers and larger televisions, heavy appliances, and burglar alarms -- are permanently connected to the power grid (and may thus also be beneficially combined with agents!), other, battery-powered, clients -- notably including telephones, portable computers and portable radios and televisions -- immediately benefit from the present invention's re-partitionment of the "framework" of wireless communications.~~
Although some clients, notably including non-portable species of computers and larger televisions, heavy appliances, and burglar

alarms, are permanently connected to the power grid, other battery-powered clients, notably including telephones, portable computers and portable radios and televisions, can immediately benefit from the present invention's re-partitionment of the "framework" of wireless communications. This is because the power requirements for these clients are sharply reduced: the clients need normally wirelessly communicate only to a very nearby agent a power-grid-powered wall-plugged radio frequency transceiver that is normally within the same room. Certainly, some clients that are permanently connected to the power grid may also be beneficially combined with agents.

Please amend the paragraph beginning at page 11, line 6 as follows:

Little of this functionality is earthshaking, being that it has, by and large, recently come to exist in cellular and other mesh communications networks. In the past, however, the digital "intelligence" associated with communications system management has been reserved for physically large, geographically extensive, communications systems such as might typically serve a town or a city. The present invention has the "audacity" to bring the most powerful mesh communications methods -- developed over decades at immense cost but as are now increasingly implemented in application specific integrated circuit chips -- directly into

the smallest environment: the home or office. Exactly because this environment is the "poorest" in every way --in power, in bandwidth, and in the confusingly high diversity of low sophistication communicating equipments --it is the very environment that can most benefit from the application of state-of-the-art sophisticated distributed communications control methodology. This is exactly what the present invention teaches to do.

Please amend the paragraph beginning at page 14, line 19 as follows:

By this organization the agents are each powered from the power grid while at least one of the clients -- and normally many, most or even all clients -- is powered from a portable power source. Nonetheless that an individual client may be powered by battery power source, it can radio-communicate to at least some agent. Meanwhile, the several power-grid-powered agents ~~radiocommunicate~~ communicate via radio links among themselves in a communications mesh network. Therefore, at the very onset, the system of the present invention suffices to extend battery-powered radio-communication from a battery-powered radio-communicating agent to at least some number of power-grid-powered communication agents.

Please amend the paragraph beginning at page 19, line 13 as follows:

Accordingly, the radio spectrum resource may be viewed as being time-shared among agents and clients, although, in general, the radio resource manager/controller is free to partition time and spectrum in any way consistent with the capabilities of the devices, the demand, and the desire to variously conserve both battery power and radio bandwidth. This is an important concept: because the network is "ad hoc"; it configures in a manner best calculated to conserve bandwidth where, by operation of the present invention, power is innately conserved. If new clients and/or agents are added, the network will automatically re-configure. The network ends up being dynamic, and adaptive, to conserve both battery power and radio bandwidth. For example, suppose some battery-powered client constantly early discharges its batteries in a manner disadvantageous to its desired use. ~~Simply~~ Under this condition, adding ~~a~~ an agent plugged to a wall plug in close proximity to the client may serve to significantly help the client's energy budget, and to usefully prolong the duration of the client's operation before battery discharge occurs.

Please amend the paragraph beginning at page 23, line 12 as follows:

For example, whenever agent A3 sends, agents A2, A5 and A6 are capable of receiving that signal. There is no client -- or at least no remote radio-communicating client, being that a client may be integrated with and agent -- associated with agent A3. An agent communicating with a client is, for example, agent A2 that is associated with, and that communicates with, client C2. A pair of agents associated with, and communicating with, a single client are agents A5 and A4 that communicate with client C3: agent A5 sending communications to the client C3 while agent A4 accepts communications from the client [[A3]] C3.

Please insert the following prior to the paragraph beginning at page 27, line 2:

In summary, this application describes various wireless systems and techniques. In one implementation, a wireless communications system may include the following:

a plurality of communication agents, each powered from a power grid, forming a communications mesh to first locally wirelessly radio-communicating between themselves in a local wireless radio communications network, with each communications agent second locally wirelessly radio-communicating with associated ones of plurality of clients; and

a plurality of clients, each performing an additional function other than just radio communication, at least one of

which clients is powered from a portable power source, each client locally wirelessly communicating by radio with at least one associated communications agent, and with no other clients nor any unassociated agents;

wherein each of the plurality of agents is powered from the power grid while at least one of the plurality of clients are powered from a portable power source.

In the above system, one of the agents that is locally wirelessly radio-communicating with at least one client may also wirelessly radio-communicating to a gateway device communicating upon a worldwide communications network external to the home or business. The wireless radio communication between the agents may be further globally communicated by the gateway device to the external worldwide communications network. The gateway device may globally communicate via a physical communication channel selected from the group consisting of wire and fiber. The gateway device may also globally communicate via an free-space communication channel selected from the group consisting of radio and free-space optical.

In the above system, at least one of the clients may be drawn from a group consisting of telephones, televisions, computers, keypad controllers, burglar alarms, and appliances. In addition, at least some of the clients may not be powered from a portable power source and are instead powered from the

power grid and at least some of these at least some clients powered from the power grid may be physically housed with some ones of the agents which agents are all, and always, powered from the power grid. The radio-communicating between agents upon the network may be multi-hop.

Furthermore, the radio-communicating between the plurality of agents upon the network may transpire in a communications protocol that consumes a relatively higher power, the radio-communicating between the plurality of clients and associated ones of the plurality of agents may transpire in a communications protocol that consumes a relatively lesser power, and the power consumed by a client, at least one of which is powered from a portable power source, radio communicating with an associated agent, which agent is invariably powered from a power grid, may be less than the power, consumed radio-communicating between any two of the plurality of agents.

In yet another implementation of the system, the radio-communicating between the plurality of agents upon the network may transpire in a communications protocol that consumes a relatively more bandwidth and relatively less time, the radio-communicating between the plurality of clients and the plurality of agents may transpire in a communications protocol that consumes relatively less bandwidth and relatively more time, and the time and spectrum of radio communication may be partitioned.

In another implementation, a wireless communications management system is provided to wireless communicatively interconnect a plurality of clients, at least one of which is powered from a portable power source and at, least one of which both locally wirelessly communicates by radio and performs some additional function with and for a human user other than just radio communication. This system comprises a plurality of communication agents, each powered from a power grid within a home or business, collectively forming a communications mesh. Each agent is first to locally wirelessly radio-communicate with other agents in a local wireless radio communications network, and is second to locally wirelessly radio-communicate with local ones of the plurality of clients. The collective agents are to register clients to the communications mesh, maintain a link to external networks, and self-organize the communications mesh.

In the above wireless communications management system, the collective agents may further adapt wireless communications upon the mesh, to any of the numbers, powers and instantaneous communications requirements of the clients then connected on and by the communications mesh. The collective agents may further authenticate visiting clients to the communications mesh. The collective agents maintaining the link to an external networks may maintain a link to a worldwide communications network. The wireless collective agents self-organizing the communications

mesh may implement the MAC protocol or the LLC protocol. In addition, the collective agents may further maintain link addresses for all clients and agents.

A two-tier wireless communications system may be provided based on the description of this application. This system may include a plurality of communication agents:

first locally wirelessly radio-communicating between themselves to such extent as wireless connectivity in a local wireless radio communications network permits, the first locally wirelessly radio-communicating transpiring in a first communications tier separate from any other communications tier, with each agent

second wirelessly radio-communicating with one or more uniquely associated clients to such extent as wireless connectivity in a local wireless radio communications network permits, the second wirelessly radio-communicating transpiring in a second communications tier separate from the first and from any other communications tier; and

a plurality of clients each locally wirelessly radio-communicating in a local wireless radio communications network to one or more associated agents, only, with no communication transpiring to any un-associated ones of the plurality of agents, this locally wirelessly radio-communicating transpiring in the second communications tier;

wherein the plurality of communication agents are self-organizing to produce a communications mesh while each of the plurality of clients is capable only of identifying, and communicating to, one or more agents;

wherein the plurality of clients become communicative from one to another only by communication links proceeding through one or more of the plurality of agents.

In the above system, the first locally wirelessly radio-communicating between plurality of agents at the first communications tier may be at a first radio frequency; and the second locally wirelessly radio-communicating between plurality of agents and associated ones of the plurality of clients at the second communications tier may be at a second radio frequency.

Alternatively, the first locally wirelessly radio-communicating between plurality of agents at the first communications tier may be at a first time interval and the second locally wirelessly radio-communicating between plurality of agents and associated ones of the plurality of clients at the second communications tier may be at a second time interval.

Furthermore, the first locally-wirelessly radio-communicating between plurality of agents at the first communications tier may be at a first code division; and the second locally wirelessly radio-communicating between plurality

of agents and associated ones of the plurality of clients at the
second communications tier may be at a second code division.